activities as generally as or with anything like the rigidity assumed by some workers. The fact of vicarious conditions, or stimuli, renders the conception of limiting factors less definite. In some light requiring seeds, for instance, several things can be substituted for light, as salts, higher temperatures, acids, etc. To speak of the lack of sufficient light as a limiting factor to germination helps little. What should be learned is, what internal condition, or inhibitor, may any one of these factors act upon to initiate growth? The conception of an external condition as a limiting factor frequently leads physiologists to fail to examine the internal mechanism upon which that and other factors play to bring about a given result. The reviewer feels that the law of the minimum should be applied to biological problems with due realization of its limitations. —WM. CROCKER.

Vegetation of Pennsylvania.—A description of the vegetation of the western part of Pennsylvania, by CRIBBS,[36] is organized upon a physiographic basis, including the swamp, lake-forest, ravine-valley, river, and upland series. The plant succession in each series is outlined and the composition of the principal associations indicated. The upland forest serves to indicate the interesting position of the flora, partaking of the northern forms, as seen in *Pinus Strobus*, *Betula lutea*, and *B. lenta*, combined with such typically southern species as *Magnolia acuminata*. The dominant members of the climax forest are found to be *Fagus grandifolia*, *Castanea dentata*, *Quercus alba*, and *Acer rubrum*. With these are associated such others as *Tsuga canadensis*, *Magnolia acuminata*, *Liriodendron Tulipifera*, and *Tilia americana*.—GEO. D. FULLER.

Germination of spores.—BRIERLY[37] has done an interesting piece of work upon spore germination which he summarizes as follows: "The ripe ascospores of *Onygina equina* will germinate directly after a prolonged resting period, which may be curtailed or eliminated by a preliminary treatment of the spores with artificial gastric juice, but not by subjection to low temperatures. The full grown unripe ascospores and the chlamydospores will germinate immediately in the absence of digestive treatment." Demand for a rest period is common in seeds. Frequently the need for a rest period is imposed by the presence of seed coats. Likewise BRIERLY believes this need is imposed in this form by the presence of the spore coat.—WM. CROCKER.

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[36] CRIBBS, J. E., Plant associations of western Pennsylvania with special reference to physiographic relationship. Plant World **20**:97–120, 142–157. 1917.

[37] BRIERLY, WILLIAM B., Spore germination in *Onygina equina* Willd. Ann. Botany **31**:127–132. 1917.